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IS : 7998 - 1986

*Indian Standard*

SPECIFICATION FOR  
CONTACT BREAKERS FOR TWO WHEELERS,  
THREE WHEELERS AND STATIONARY  
SPARK IGNITION ENGINES

( *First Revision* )

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NEW DELHI 110002

**AMENDMENT NO. 2 JANUARY 1993  
TO  
IS 7998 : 1986 SPECIFICATION FOR CONTACT  
BREAKERS FOR TWO WHEELERS, THREE  
WHEELERS AND STATIONARY SPARK IGNITION  
ENGINES**

**( *First Revision* )**

**[ Page 6, clause 5.2(f) ] — Delete.**

**( TED 11 )**

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**Reprography Unit, BIS, New Delhi, India**

**AMENDMENT NO. 1 JANUARY 1992  
TO  
IS 7998 : 1986 SPECIFICATION FOR CONTACT  
BREAKERS FOR TWO WHEELERS, THREE  
WHEELERS AND STATIONARY SPARK IGNITION  
ENGINES**

*( First Revision )*

*( Page 7, clause 5.11, last line )* — Substitute '5.6 and 5.7' for '6.6 and 6.7'.

*( Page 8, clause 5.14, last line )* — Substitute '5.6' for '6.6'.

**( TED 11 )**

# Indian Standard

## SPECIFICATION FOR CONTACT BREAKERS FOR TWO WHEELERS, THREE WHEELERS AND STATIONARY SPARK IGNITION ENGINES

( First Revision )

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## *Indian Standard*

### **SPECIFICATION FOR CONTACT BREAKERS FOR TWO WHEELERS, THREE WHEELERS AND STATIONARY SPARK IGNITION ENGINES**

### *( First Revision )*

#### **0. FOREWORD**

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 23 October 1986, after the draft finalized by the Automotive Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** This standard was published in 1976. This revision has been undertaken with a view to update the standard in the light of the experience gained since then and to include the environmental test for the contact breakers.

**0.3** This standard does not define the associated cam form, cam location or automatic advance mechanism, since these features are dependent upon the design of the engine, for example, maximum speed and timing characteristic.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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#### **1. SCOPE**

**1.1** This standard covers mechanical requirements and methods of tests for contact breakers used on two wheelers, three wheelers and stationary spark ignition engines having either:

- a) battery coil ignition system, or
- b) magnetic/alternator-coil, energy transfer ignition system.

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\*Rules for rounding off numerical values ( revised ).

**1.2** This standard does not cover automatic advance mechanisms and cam profiles.

## **2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Contact Breaker** — Contact breaker is a cam operated switch used in ignition electric circuit.

**2.2 Type Tests** — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of contact breaker.

**2.3 Routine Tests** — Tests carried out on each contact breaker to check requirements which are likely to vary during production.

**2.4 Acceptance Tests** — Tests carried out on samples taken from a lot.

## **3. DESIGN AND CONSTRUCTION**

**3.1** There shall not be any contact bounce nor missing of spark until the cam reaches the maximum specified speed.

**NOTE** — The designed speed shall be as agreed with the engine manufacturer and is dependent upon the cam design.

**3.2** Tungsten contacts shall be used in the contact breakers.

**3.3** Contact pressure shall not be less than 5 N.

**3.4** Provision shall be made to adjust the operating point ( timing ) of contacts by a total of 20° with respect to shaft.

**3.5** The contact gap shall be adjustable through 1 mm from new position to accommodate for wear of heel and contact erosion.

**3.6** A capacitor shall be fitted to reduce sparking at the contacts and to improve the life of contacts.

**3.7 Terminals** — The contact breaker terminal may be brought out through a cable. The cable length, colour and connection shall be as agreed between the purchaser and the manufacturer.

## **4. MARKING**

**4.1** The contact breaker shall be marked with the following:

- a) Type number, and
- b) Manufacturer's name or trade-mark.

## 4.2 The contact breaker may also be marked with the Standard Mark.

**NOTE** — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 5. TESTS

**5.1 Type Tests** — The following shall constitute type tests:

- a) Visual examination ( *see 5.4* ),
- b) Dimensional check up ( *see 5.5* ),
- c) High speed test ( *see 5.6* ),
- d) Insulation resistance test ( *see 5.7* ),
- e) High voltage test ( *see 5.8* ),
- f) Endurance test ( *see 5.9* ),
- g) Vibration test ( *see 5.10* ),
- h) Dry heat test ( *see 5.11* ),
- j) Damp heat ( cycling ) test ( *see 5.12* ),
- k) Cold test ( *see 5.13* ),
- m) Dust test ( *see 5.14* ),
- n) Mould growth test ( *see 5.15* ),
- p) Corrosion resistance test ( *see 5.16* ).

**5.1.1 Criteria for Approval** — Nine samples shall be submitted for testing together with the relevant data. These shall be tested according to the test schedule given in Appendix A. The testing authority shall issue a type approval certificate if the contact breakers are found to comply with the requirements of the tests given in 5.1.

**5.1.2** In case of failure in one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to the test(s) in which the failure occurred. If in repeat tests no failure occurs, the tests may be considered to have been satisfied.

**5.2 Acceptance Tests —** The following shall constitute acceptance tests:

- a) Visual examination ( *see 5.4* ),
- b) Dimensional check up ( *see 5.5* ),
- c) High speed test ( *see 5.6* ),
- d) Insulation resistance test ( *see 5.7* ),
- e) High voltage test ( *see 5.8* ), and
- f) Endurance test ( *see 5.9* ).

**NOTE —** The number of samples for acceptance tests and the criteria for acceptance shall be as agreed between the purchaser and the manufacturer. However, a recommended plan of sampling is given in Appendix B.

**5.3 Routine Tests —** The following shall constitute routine tests:

- a) Visual examination ( *see 5.4* ),
- b) High speed test ( *see 5.6* ),
- c) Insulation resistance test ( *see 5.7* ), and
- d) High voltage test ( *see 5.8* ).

**5.4 Visual Examination —** The contact breaker shall be examined for workmanship and finish and shall be free from injurious flaws or other defects.

**5.5 Dimensional Check Up —** The contact breaker shall be checked for dimensions and shall conform to the dimensions agreed to between the purchaser and the manufacturer.

**5.6 High Speed Test —** There shall be no misfiring nor contact bounce till the cam reaches maximum designed speed when tested using associated cam and coil.

**5.7 Insulation Resistance Test —** The insulation resistance between the insulated contacts and the main body shall not be less than 1 megohm, when measured with a dc potential of 500 volts, at the prevailing atmospheric temperature and humidity conditions.

**5.8 High Voltage Test —** The contact breaker shall withstand 500 V ac for 5 seconds at any available supply frequency between 40 to 60 Hz, applied between body and the insulated contact with the contacts in the open position, at the prevailing atmospheric temperature and humidity conditions.

**5.9 Endurance Test**

**5.9.1 Equipment —** A constant speed drive running at maximum contact breaker speed for the given application, associated cam, and coil

shall be used. The cam finish shall be 32  $\mu$ mRa or better according to IS : 3073-1967\*.

**5.9.2 Procedure** — The test shall be carried out at ambient (room) temperature at a constant speed of the contact breaker for the given application.

The spark gap shall be set for 10 kV (6 mm) [see also IS : 1062-1963†].

The cam face shall be lubricated at regular intervals for not less than 150 hours or as specified by manufacturer.

The contact gap shall be checked after 50 hours of operation and at each subsequent 150 hours. It shall be re-set within manufacturer's specified limits wherever these limits are exceeded by 0.1 mm. The change in gap shall be noted in each case.

The test duration shall be 500 hours.

**5.9.3 Assessment** — At the end of the test, contact breaker shall meet the following conditions:

- Contact wear shall not exceed 0.5 mm when measured across the pair of contacts, and
- The heel wear shall not exceed 1.0 mm when calculated as changed in gap setting.

**5.10 Vibration Test** — The test shall be conducted according to 4.1 of IS : 10250-1982‡ under the following conditions:

Frequency range	10-55-10 Hz
Displacement amplitude	1.5 mm
Total duration	3 hours

**5.11 Dry Heat Test** — The test shall be conducted according to 4.2 of IS : 10250-1982‡ under the following conditions:

Temperature	70 $\pm$ 2°C
Duration	4 hours

After the completion of the test, the contact breaker shall pass the tests at 6.6 and 6.7.

**5.12 Damp Heat (Cycling) Test** — The test shall be conducted according to 4.3 of IS : 10250-1982‡.

The number of conditioning cycles shall be seven.

At the end of the conditioning, the contact breaker shall pass the tests at 5.7.

\*Assessment of surface roughness.

†Methods of test for sparking plugs (revised).

‡Severities for environmental tests for automotive electrical equipment.

**5.13 Cold Test** — The test shall be conducted according to 4.4 of IS : 10250-1982\* under the following conditions:

Temperature	-10 ± 3°C
Duration	2 hours

After the completion of the test, parts of non-metallic material shall not show any breakages/deformations. The contact breaker shall meet the requirements of the tests at 5.6 and 5.7.

**5.14 Dust Test** — The test shall be conducted according to 4.6 of IS : 10250-1982\*.

After the test the contact breaker shall meet the requirements of the test at 6.6.

**5.15 Mould Growth Test** — The test shall be conducted according to 4.7 of IS : 10250-1982\*.

There shall be no growth apparent under a magnification of 50 × [ corresponding to 0 according to 7.3 of IS : 9000 ( Part 10 )-1980† ].

**5.16 Corrosion Resistance Test** — The test shall be conducted according to 4.8 of IS : 10250-1982\*.

After the test, the contact breaker shall meet the requirements of the test at 5.6 and 5.7.

## APPENDIX A

( Clause 5.1.1 )

Clause No.	Test	Sequence								
		Sample No.								
		1	2	3	4	5	6	7	8	9
5.4	Visual examination	x	x	x	x	x	x	x	x	x
5.5	Dimensional check up	x	x	x	x	x	x	x	x	x
5.6	High speed test	x	x	x	x	x	x	x	x	x
5.7	Insulation resistance test	x	x	x	x	x	x	x	x	x
5.8	High voltage test	x	x	x	x	x	x	x	x	x
5.9	Endurance test	x	x							
5.10	Vibration test			x						
5.11	Dry heat test				x					
5.12	Damp heat ( cycling ) test					x				
5.13	Cold test						x			
5.14	Dust test							x		
5.15	Mould growth test								x	
5.16	Corrosion resistance test									x

\*Severities for environmental tests for automotive electrical equipment.

†Basic environmental testing procedures for electronic and electrical items: Part 10 Mould growth test.

## APPENDIX B

( Clause 5.2 )

RECOMMENDED PLAN OF SAMPLING FOR  
ACCEPTANCE TESTS

## B-0. GENERAL

**B-0.1** If statistical quality control techniques have been used for production control such test results and relevant charts may be made available along with the material supplied to enable the purchaser to judge the acceptability or otherwise of a lot. In case such information is not available, the following procedure is recommended for judging conformity of a lot with the requirements of specification.

## B-1. SCALE OF SAMPLING

**B-1.1 Lot** — In any consignment, all the contact breakers of the same size and from the same batch of manufacture shall be grouped together to constitute a lot.

**B-1.2** The number of contact breakers to be selected from a lot shall depend upon the lot size and shall be in accordance with col 1 and 2 of Table 1.

TABLE 1 SAMPLE SIZE AND PERMISSIBLE NUMBER OF DEFECTIVES

Lot Size (N) (1)	SAMPLE SIZE (n) (2)	PERMISSIBLE NUMBER OF DEFECTIVES (3)
101 to 150	8	0
151 " 300	13	0
301 " 500	20	0
501 " 1 000	32	1
1 001 and above	50	1

NOTE — For the lot size up to 100, the sample size shall be as agreed upon between the manufacturer and the purchaser and the lot shall be accepted if there is no defective in the sample.

**B-1.3** These contact breakers shall be selected at random. In order to ensure randomness, the following procedure may be adopted:

Arrange the contact breakers in a systematic manner and starting from any switch count them as 1, 2,.....etc, up to  $r$ ,  $r$  being equal to the integral part of  $N/n$ ,  $N$  being the lot size and  $n$  the sample size. Every  $r$ th switch shall be included in the sample.

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**B-2. NUMBER OF TESTS**

**B-2.1** All the contact breakers selected under B-1.2 shall be subjected to acceptance tests given in 5.2.

**B-3. CRITERION FOR CONFORMITY**

**B-3.1** A lot shall be considered as conforming to this specification, if the number of switches out of those tested, failing to satisfy the requirements of any one or more of acceptance tests, does not exceed the corresponding number given in col 3 of Table 1.





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